MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-UFP-VSL-00001B

Project:	***RPP-WTP***	P&ID:	***24590-PTF-M6-UFP-P0001/P0007/P0008 & 24590-PTF-M6-PWD-P0046*** 1
Project No:	***24590***	Process Calculation:	***DELETED*** 1
Project Site:	***Hanford***	Vessel Drawing	***24590-PTF-MV-UFP-P0002***
Description:	***Ultrafiltration Feed Preparation Vessel*** 1		

Reference Data

Charge Vessels (Tag Numbers)	***DELETED***
Pulsejet Mixers / Agitators (Tag Numbers)	***UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-000102***
RFDs/Pumps (Tag Numbers)	***DELETED***

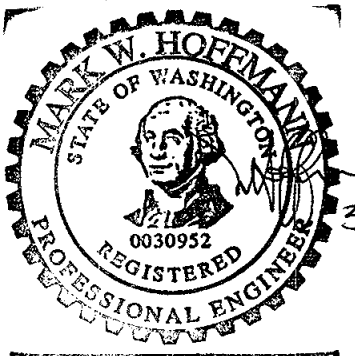
Design Data

Quality Level	***QL-1***		Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category	***SC-I***		Design Code	***ASME VIII Div 1***		
Service/Contents	***Radioactive Liquid***		Code Stamp	***Yes***		
Design Specific Gravity	***1.32***		NB Registration	***Yes***		
Maximum Operating Volume gal	***64,626***		Weights (lbs)	Empty	Operating	Test
Total Volume gal	***75,593***		Estimated	***184,000***	***934,000***	***822,000***
Environmental Qualification	***N/A*** 1		Actual *	***223,240*** 1	***970,440*** 1	***887,140*** 1

Inside Diameter	inch	***240***			Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***306***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001***	
Internal Pressure	psig	***ATM***	***15***	***35***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***0.217***	***12*** 1 ***(Note 3,4)***	***0.0***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***122***	***150***	***150*** 1	Corrosion Allowance	Inch	***0.040 (See Notes 12)*** 1
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC



This Bound Document Contains a total of 4 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	3/28/05	Issued for Permitting Use				
0	10/8/03	Issued for Permitting Use	J. Jackson	H. Khurana	C. Slater	M. Hoffmann

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00001B

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 Note 1	See Drawing	Auxiliary (See Note 8) 1
Shell	SA 240 316 Note 1	See Drawing	Primary (See Note 8) 1
Bottom Head	SA 240 316 Note 1	See Drawing	Primary (See note 8) 1
Support	SA 240 304 Note 1	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	SA 240 316 Note 1	See Drawing	N/A
Internals	SA 240 316 Note 1	See Drawing	Thermowells Primary
Pipe Nozzles	SA 312 TP316 Note 1	See Drawing	Primary (See note 8) 1
Forgings/ Bar stock	SA 182 F316 Note 1	See Drawing	N/A
Wash Ring Pipe	SA 312 TP316 Note 1	See Drawing	N/A
Bolting/Gaskets	N/A	N/A	N/A
Wear Plates	SA 240 316 Note 1	See Drawing	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 2 1
		External Finish	Note 2 1

Remarks

* To be determined by the vendor.

Note 1. Maximum 0.030% carbon.

Note 2. Welds de-scaled as laid.

Note 3. External design pressure under the jacket shall be rated for the jacket design pressure plus 1 psig internal vacuum in the vessel to account for ventilation fan pressure. 1

Note 4. The vessel design external pressure is estimated only and shall be confirmed by the Seller's calculations. 1

Note 5. DELETED 1

Note 6. Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals. 1

Note 7. This vessel is in a Black Cell. 1

Note 8. All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination. 1

Note 9. Contents of this document are Dangerous Waste Permit affecting. 1

Note 10. DELETED 1

Note 11. DELETED 1

Note 12. BNI shall ensure that an additional 0.087" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers. 1

Note 13. Seller shall provide wear plates for erosion control on the bottom head.

Note 14. All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 1

Note 15. Required data for thermal stress analysis for nozzles exposed to higher temperatures. 1

- Cell ambient temperature = 113 °F
- Headspace temperature or Operating temperature = 122 °F
- Ambient and headspace natural convection heat transfer coefficients = 0.703 Btu/hr ft^2 F
- Inlet fluid transfer frequency and mass flow rate for nozzles N15 and N55.

  Fluid max temperature = 212 °F

  Transfer frequency = 1 transfer/9 days for 1.5 hrs.

  Steam mass flow rate = 2885 lb/hr

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00001B

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-PTF-MV-UFP-UFP-VSL-00001B*
Component Description	*Ultrafiltration Feed Preparation Vessel*

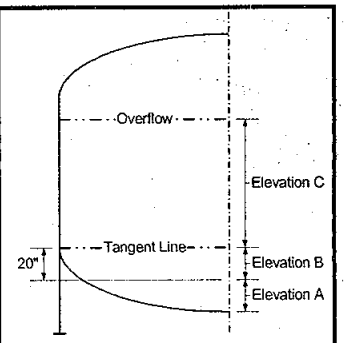
The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316, max. Carbon content 0.030 %*
Design Life	*40 Years*
Component Function and Life Cycle Description	*The system receives waste feed from the Waste Feed Evaporation Process System (FEP), and HLW Feed Receipt Vessel (HLP). The vessel is filled over a period of approximately 48 hours. If necessary, the vessel cools the waste prior to ultrafiltration operations. The precipitation of Sr/TRU compounds occurs in this vessel for Envelope C. The main transfer from this vessel occurs through a centrifugal pump to the Ultrafiltration Feed Vessels.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-12*	*15*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*-0.217*	*0*	*N/A*	*The vessel will remain at constant pressure depending upon the HVAC plant*
Operating Temp	°F	*50*	*122*	*3650*	
Contents Specific Gravity		*1.00*	*1.32*	*3650*	
Contents Level	inch	*28*	*350*	*3650*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range*			

Hydrodynamic Loading 1

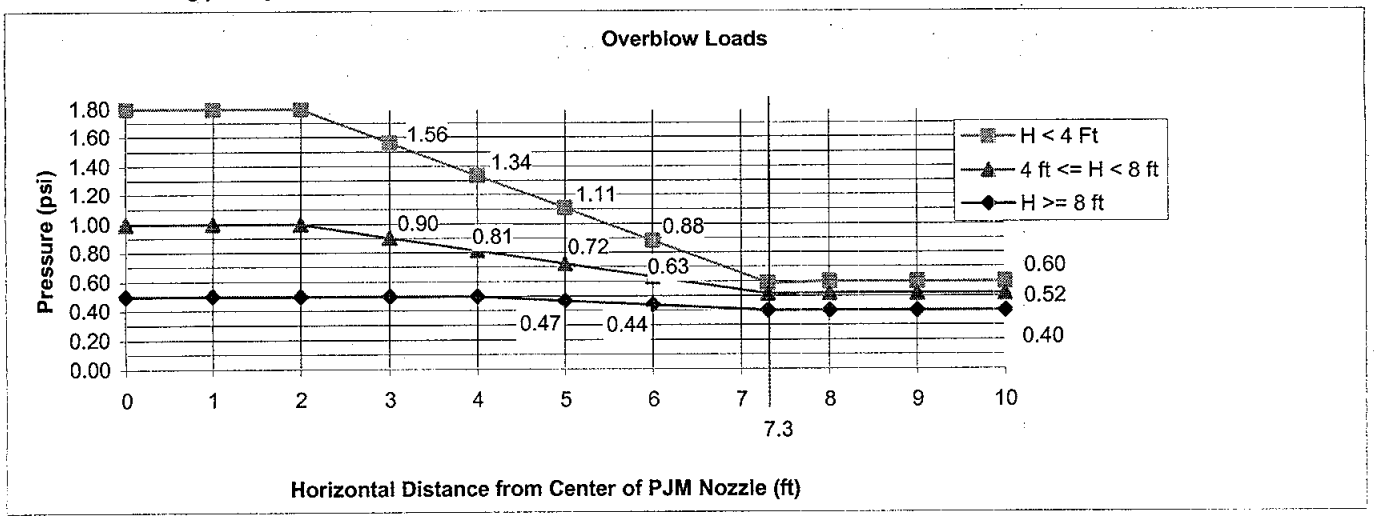
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.



The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*16.4 X 10^6*

Overblow loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles.

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-PTF-MV-UFP-VSL-00001B***

Notes

- ***Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*** 1
- ***Nozzles N18 and N55 shall be fatigue assessed/analyzed for 3650 temperature/pressure cycles from 0 psig at 59°F to 15 psig at 212°F, the pressure cycle shall coincide with the temperature cycle. See note 15 on page 2.*** 1

Equipment Cyclic Data Sheet

Component Plant Item Number:	***UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-00102***
Component Description	***Pulse Jet Mixers***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***ASME SA240 316 with max. carbon content of 0.030 % carbon***
Design Life	***40 Years***
Component Function and Life Cycle Description	***These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.*** 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***80***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***FV***	***72.5***	***1.64×10^7***	
Operating Temperature	°F	***68***	***122***	***3650***	***Parent vessel will operate normally at a temperature of 77 °F***
Contents Specific Gravity		***1.00***	***1.32***	***3650***	
Contents Level	inch	***Empty***	***Flooded***	***1.64×10^7***	
Thrust 1	lbf	***0***	***330***	***1.64×10^7***	
Localized Features					
Nozzles		***Within 9°F of operating temperature range.***		***As above***	
Supports		***Buoyant***	***Loaded***	***1.64×10^7***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- ***DELETED***